MULTIMEDIA UNIVERSITY*

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2022/2023 (TERM ID 2230)

PPS0034 – INTRODUCTION TO PROBABILITY AND STATISTICS

(Foundation in Business)

07 OCTOBER 2023
9.00 a.m. – 11.00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of 4 pages with **THREE** questions.
2. Attempt **ALL** four questions. The distribution of the marks for each question is given.
3. Please write all your answers in the answer booklet provided. All necessary workings **MUST** be shown.
4. **Formulae** are provided at the back of the question paper.
5. **Statistical table** is provided.

QUESTION 1

a) The following table lists the probability distribution of the number of laptops sold per week in a showroom based on past data.

Number of laptops sold per week (X)	0	1	2	3	4
Probability $P(X=x)$	m	0.20	$8m$	0.25	$2m$

i) Find the value of constant m. (3 marks)

ii) Find the probability that the number of laptops sold during a given week is not less than 2. (3 marks)

iii) Find the mean and variance for this probability distribution. (6 marks)

b) A student must score 85 marks and above in order to qualify for a scholarship. The probability that a student who scores 85 marks and above is 0.34. If 18 students are selected randomly, find the probability that:

i) between 3 and 12 students are qualified for the scholarship. (4 marks)

ii) not more than 8 students are **not** qualified for the scholarship. (4 marks)

iii) 2 to 13 students are **not** qualified for the scholarship. (5 marks)

c) Success Airlines sold an average of 8.8 tickets in every 11 minutes. Find the probability that:

i) exactly 21 tickets are sold in 25 minutes. (5 marks)

ii) at least 6 tickets are sold in 2 minutes. (4 marks)

d) A study found that consumers spend an average of RM27 per week using a credit card. Assume that the amount spent using a credit card is normally distributed and that the standard deviation is RM8. What is the probability that a randomly selected person will spend between RM22 and RM38? (6 marks)

(Total 40 marks)

Continued...

QUESTION 2

a) The scores of all 8 students in a final examination are given as below:

63 76 43 81 29 63 81 50

i) List all the possible samples of size seven (without replacement) from this population and construct the sampling distribution of the sample mean. Then, find the sampling error for each sample. (20 marks)

ii) If we take a random sample of seven students from this population which includes the marks 63, 76, 43, 81, 29, 63 and 81, calculate the non-sampling error if we mistakenly recorded the last score as 89 instead of 81. (4 marks)

b) It is known that the average monthly healthy drink expenses for a family is RM658. Suppose the standard deviation of the monthly expenses for a family is RM93, for 68 families, find

i) the mean, and the standard deviation of the sample mean? (3 marks)

ii) the probability that the sample mean is less than RM588. (3 marks)

(Total 30 marks)

QUESTION 3

a) Listed below are the scores of final examinations for a randomly selected college students on English subject. The average score of final examination for all college students is 68 with a standard deviation of 6.2. Use a 0.02 significance level to test the claim that the sample is from a population with a mean that is different from 68.

68	68	72	73	65	74	73	72	68	65
73	65	71	66	74	68	71	66	73	65
59	75	70	56	66	75	68	75	62	72
75	58	73	60	74	58	75	61	73	60

(12 marks)

Continued...

b) A random sample of the starting salaries of 45 randomly selected graduates with bachelor's degrees last year provided a sample mean and a standard deviation of RM43,589 and RM7,621 respectively. Test whether the data provide sufficient evidence, at the 5% level of significance, to conclude that the mean starting salary of all graduates last year is more than the mean of all graduates two years before, $41,202.

(10 marks)

c) A random sample of 180 students from a college yields a mean GPA of 2.76 with a sample standard deviation of 0.59.

i) What is the point estimate of the population mean? Calculate margin of error for this estimate. (3 marks)

ii) Construct a 92% confidence interval for the mean GPA students at the college. (5 marks)

(Total 30 marks)

Continued...

Formulae:

1.

	Mean	Variance
Discrete Random Variable X	$\mu = E(X)$ $= \sum xP(x)$	$Var(X) = E(X^2) - [E(X)]^2$ **where** $E(X^2) = \sum x^2 P(x)$

2.

	Formula	Mean	Standard Deviation
Binomial Probability	$P(x) = \binom{n}{x} p^x q^{n-x}$	$\mu = np$	$\sigma = \sqrt{npq}$
Poisson Probability	$P(x) = \dfrac{e^{-\lambda}\lambda^x}{x!}$	$\mu = \lambda$	$\sigma = \sqrt{\lambda}$

3. The z value for a value of x: $z = \dfrac{x - \mu}{\sigma}$

4. The z value for a value of $\bar{x}$: $z = \dfrac{\bar{x} - \mu_{\bar{x}}}{\sigma_{\bar{x}}}$

where $\mu_{\bar{x}} = \mu$ and $\sigma_{\bar{x}} = \dfrac{\sigma}{\sqrt{n}}$

5. Sampling error = $\bar{x} - \mu$

Non-sampling error = incorrect $\bar{x}$ − correct $\bar{x}$

6. Point estimate of $\mu = \bar{x}$

Margin of error = $\pm 1.96\sigma_{\bar{x}} = \pm 1.96\dfrac{\sigma}{\sqrt{n}}$ or $= \pm 1.96 s_{\bar{x}} = \pm 1.96\dfrac{s}{\sqrt{n}}$

7. The $(1-\alpha)100\%$ confidence interval for μ is

$\bar{x} \pm z\sigma_{\bar{x}}$ if σ is known

$\bar{x} \pm z s_{\bar{x}}$ if σ is not known

where $\sigma_{\bar{x}} = \dfrac{\sigma}{\sqrt{n}}$ & $s_{\bar{x}} = \dfrac{s}{\sqrt{n}}$

End of Paper